

WHAT IS CLAIMED IS:

1. An optical alignment system for aligning a light beam with a core flow in a flow stream, comprising:

a flow stream having a sheath fluid and a core, wherein the core flow has a current position within the flow stream;

a light source for producing a light beam;

an optical element for directing the light beam at the core; and

an actuator for moving the optical element relative to the flow stream such that the light directed by the optical element is aligned with the current position of the core.

2. The optical alignment system of claim 1 further comprising a controller for controlling the actuator.

3. The optical alignment system of claim 2 wherein the controller receives at least one feedback signal that indicates whether the light directed by the optical element is aligned with the current position of the core flow.

4. The optical alignment system of claim 3 further comprising a detector for detecting light that is scattered and/or reflected from the core flow, and at least one of the at least one feedback signal corresponds to an output of the detector.

5. The optical alignment system of claim 4 wherein the flow stream flows down a flow channel having lateral edges, and wherein the controller uses the at least one feedback signal to detect an edge of the flow channel.

6. The optical alignment system of claim 5 wherein the controller uses the at least one feedback signal to detect an edge of the flow channel and then determines

whether the light directed by the optical element is aligned with the current position of the core flow.

7. The optical alignment system of claim 1 further comprising a detector for detecting light that is scattered and/or reflected from the core flow.

8. The optical alignment system of claim 7 wherein the light source and the optical element are positioned on one side of the flow stream, and the detector is positioned on an opposite side of the flow stream.

9. The optical alignment system of claim 8 further comprising another optical element positioned between the flow stream and the detector.

10. The optical alignment system of claim 7 wherein the light source, the optical element, and the detector are positioned on the same side of the flow stream.

11. The optical alignment system of claim 1 wherein the actuator is a motor.

12. The optical alignment system of claim 11 wherein the motor is a stepper motor.

13. The optical alignment system of claim 1 wherein the actuator is an electrostatically actuated actuator.

14. The optical alignment system of claim 1 wherein the actuator is voice coil.

15. The optical alignment system of claim 1 wherein the light source is a VCSEL.

16. The optical alignment system of claim 1 wherein the light source is an edge emitting laser.

17. The optical alignment system of claim 1 wherein the light source is an LED.

18. The optical alignment system of claim 1 wherein the light source is an end of an illuminated optical fiber.

19. The optical alignment system of claim 1 wherein the flow stream is part of a flow cytometer.

20. An optical alignment system for aligning a light beam with a core flow in a flow stream, comprising:

a flow stream having a sheath fluid and a core flow, wherein the core flow has a current position within the flow stream;

a light source for producing a light beam;

an optical element for directing the light beam at the core flow; and

an actuator for moving the light source relative to the flow stream such that the light directed by the optical element is aligned with the current position of the core flow.

21. The optical alignment system of claim 20 wherein the actuator is adapted to also move the optical element relative to the flow stream.

22. The optical alignment system of claim 20 further comprising a controller for controlling the actuator.

23. The optical alignment system of claim 22 wherein the controller receives at least one feedback signal that indicates whether the light directed by the optical element is aligned with the current position of the core flow.

24. The optical alignment system of claim 23 further comprising a detector for detecting light that is scattered and/or reflected from the core flow, and at least one of the at least one feedback signal corresponds to an output of the detector.

25. The optical alignment system of claim 24 wherein the flow stream flows down a flow channel having lateral edges, and wherein the controller uses the at least one feedback signal to detect an edge of the flow channel.

26. The optical alignment system of claim 25 wherein the controller uses the at least one feedback signal to detect an edge of the flow channel and then uses the at least one feedback signal to determine whether the light directed by the optical element is aligned with the current position of the core flow.

27. The optical alignment system of claim 20 further comprising a detector for detecting light that is scattered and/or reflected by the core flow.

28. The optical alignment system of claim 27 wherein the light source and the optical element are positioned on one side of the flow stream, and the detector is positioned on an opposite side of the flow stream.

29. The optical alignment system of claim 28 further comprising another optical element positioned between the flow stream and the detector.

30. The optical alignment system of claim 27 wherein the light source, the optical element, and the detector are positioned on the same side of the flow stream.

31. The optical alignment system of claim 20 wherein the actuator is a motor.

32. The optical alignment system of claim 31 wherein the motor is a stepper motor.

33. The optical alignment system of claim 20 wherein the actuator is an electrostatically actuated actuator.

34. The optical alignment system of claim 20 wherein the actuator is voice coil.

35. The optical alignment system of claim 20 wherein the light source is a VCSEL.

36. The optical alignment system of claim 20 wherein the light source is an edge emitting laser.

37. The optical alignment system of claim 20 wherein the light source is an LED.

38. The optical alignment system of claim 20 wherein the light source is an end of an illuminated optical fiber.

39. The optical alignment system of claim 20 wherein the flow stream is part of a flow cytometer.

40. An optical alignment system for aligning a light beam with a core flow in a flow stream, comprising:

a flow stream having a sheath fluid and a core flow, wherein the core flow has a current position within the flow stream;

a light source for producing a light beam;

an optical element for directing the light beam at the core flow; and

an actuator for moving the flow stream relative to the light source and optical element such that the light directed by the optical element is aligned with the current position of the core flow.

41. The optical alignment system of claim 40 wherein the flow stream flows down a flow channel of a fluidic cartridge.

42. The optical alignment system of claim 41 wherein the actuator moves the fluidic cartridge relative to the light source and optical element.

43. The optical alignment system of claim 40 further comprising a controller for controlling the actuator.

44. The optical alignment system of claim 43 wherein the controller receives at least one feedback signal that indicates whether the light directed by the optical element is aligned with the current position of the core flow.

45. The optical alignment system of claim 44 further comprising a detector for detecting light that is scattered and/or reflected by the core flow, and wherein at least one of the at least one feedback signal corresponds to an output of the detector.

46. The optical alignment system of claim 40 further comprising a detector for detecting light that is scattered and/or reflected by the core flow.

47. The optical alignment system of claim 46 wherein the light source and the optical element are positioned on one side of the flow stream, and the detector is positioned on an opposite side of the flow stream.

48. The optical alignment system of claim 47 further comprising another optical element positioned between the flow stream and the detector.

49. The optical alignment system of claim 46 wherein the light source, the optical element, and the detector are positioned on the same side of the flow stream.

50. The optical alignment system of claim 40 wherein the actuator is a motor.

51. The optical alignment system of claim 50 wherein the motor is a stepper motor.

52. The optical alignment system of claim 40 wherein the actuator is an electrostatically actuated actuator.

53. The optical alignment system of claim 40 wherein the actuator is voice coil.

54. The optical alignment system of claim 40 wherein the light source is a VCSEL.

55. The optical alignment system of claim 40 wherein the light source is an edge emitting laser.

56. The optical alignment system of claim 40 wherein the light source is an LED.

57. The optical alignment system of claim 40 wherein the light source is an end of an illuminated optical fiber.